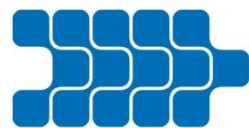


Lateral skid resistance in bends

Direction sensitivity of skid resistance in bends

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Study direction sensitivity of skid resistance in bends

- Reason for the study
- Skid resistance measuring methods
- Study structure
- Study results
- Summary

Reason for the study

- >50 years skid resistance measurements in the Netherlands were conducted with 86% retarded wheel (longitudinal direction)
- Dutch government: from 2017 skid resistance measurements on highways with SKM (fixed angle with driving direction)
- Study for sensitivity of skid resistance
- Focus in study on effect in curves



Measuring method 86% retarded wheel

- Measuring trailer
- PIARC-tyre 86% retarded
- Measurement in longitudinal direction
- Measuring speed 50 or 70 km/h
- Wet conditions (0,5mm water)

Measuring method SeitenKraft Messverfahren (SKM)

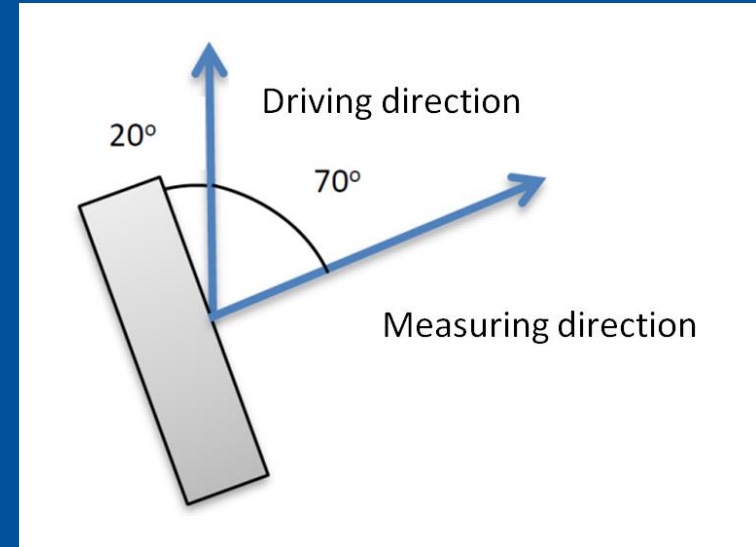
- Part of measuring truck
- Free rolling SKM-tyre
- Measures SWF of tyre under 20°
- Measurement speed 40, 60 or 80 km/h
- Wet conditions (0,5mm water)





Measurement direction SKM

- Makes angle of 20° with longitudinal direction
- Side Way Force (SWF) is measured because tyre can rotate freely



Study structure

- Study is explicitly no comparison between measurements with SKM and 86% retarded wheel
- Determine impact of measuring the skid resistance in a different direction than we were used to
- Study carried out with the Skid Resistance Tester (SRT)



Skid Resistance Tester (SRT)

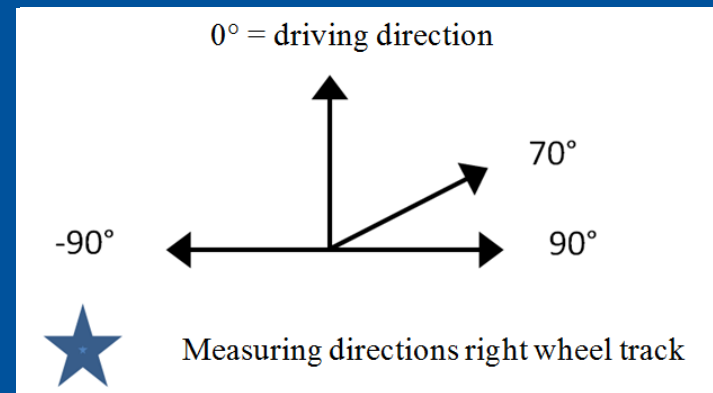
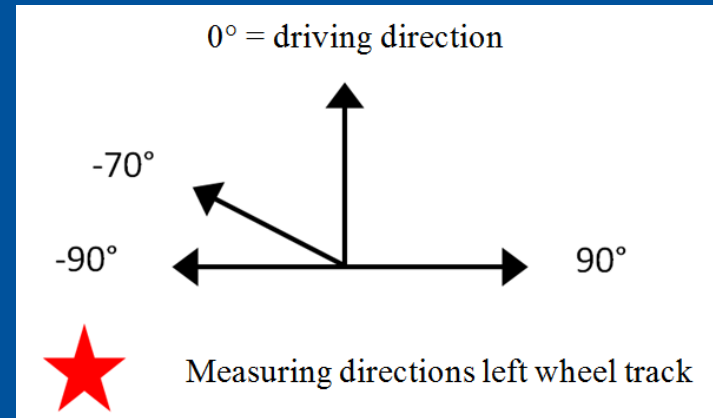
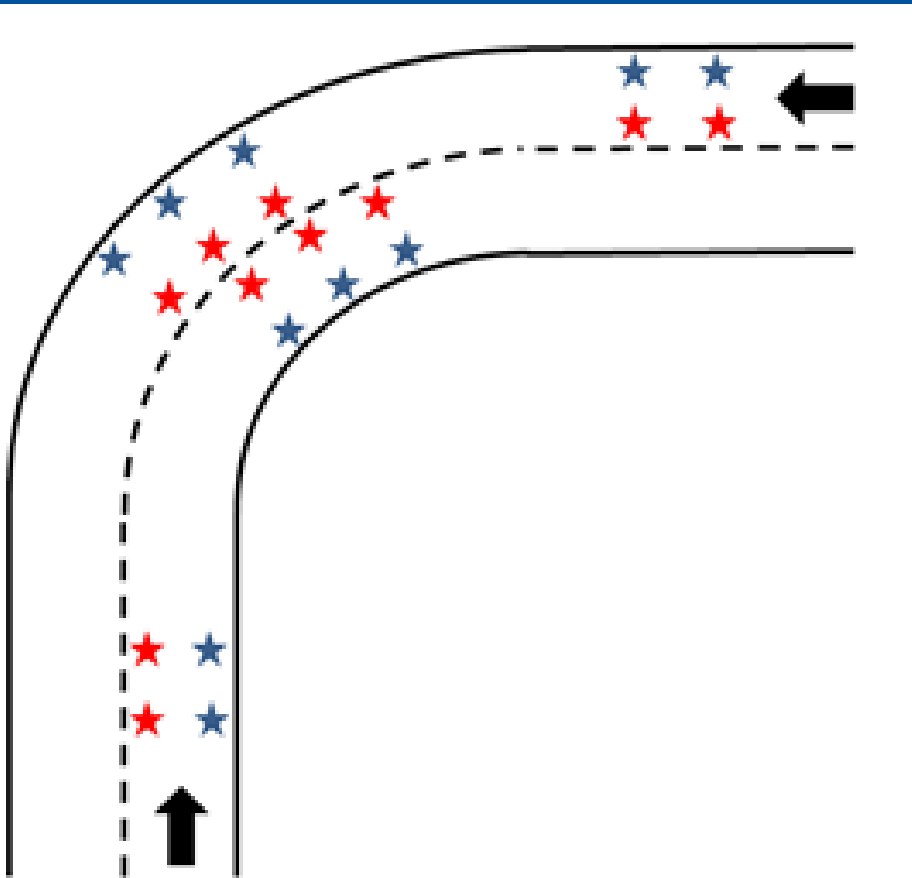
- Execution stationary on the road
- Pendulum device
- Standardized measuring rubber
- Wet conditions
- Skid resistance measurements can be executed in all directions

Sections

- Study performed on older (polished) surfaces on N319 and N330 in the Netherlands (Dense Asphalt and SMA)

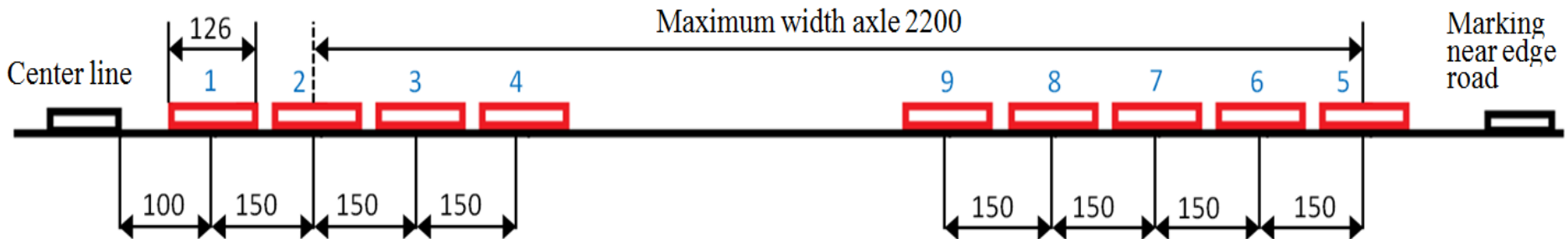


Measuring directions



Transversal position normative wheel track

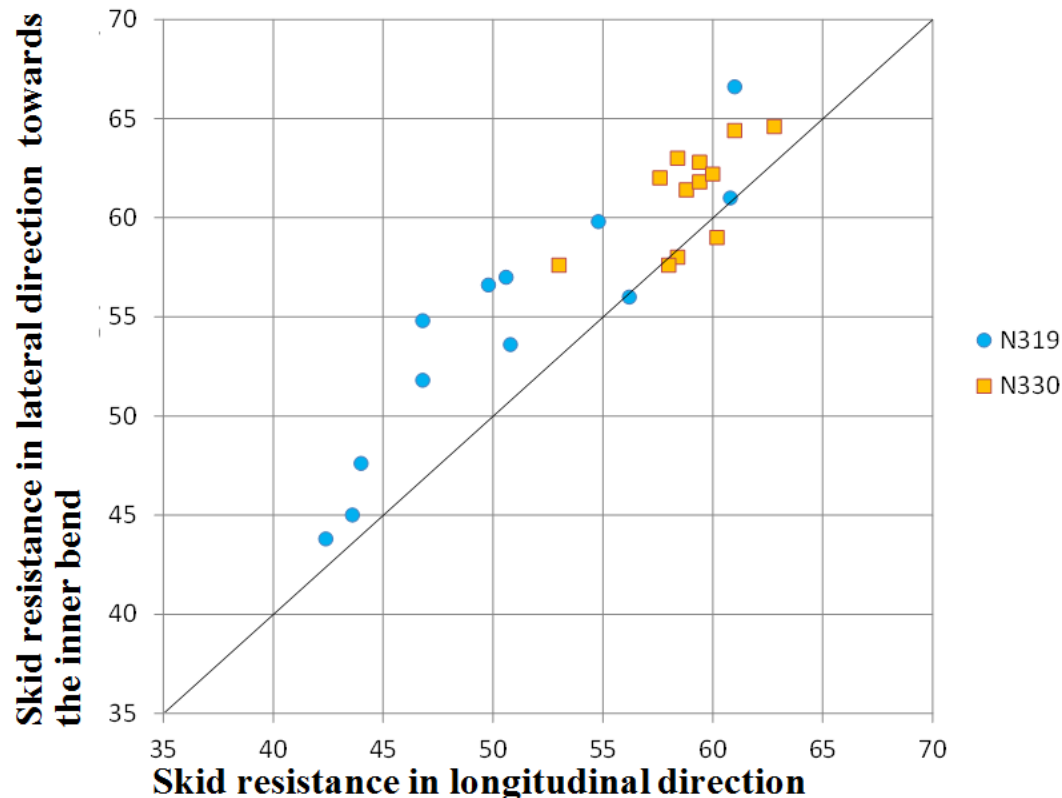
- Stepwise searching for lowest (normative) skid resistance value in each wheel track
- In bends measurement in direction towards the outer bend and on straight sections in longitudinal direction



- Distance between normative wheel tracks was in all situations 1600mm

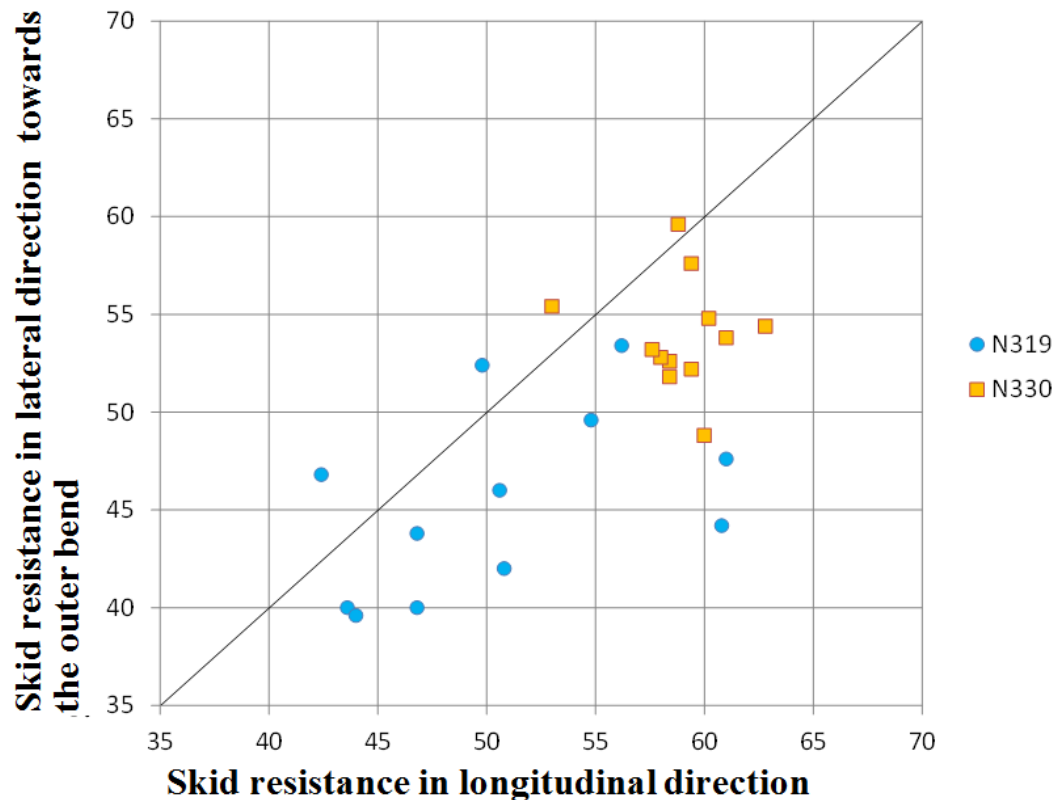
Skid resistance: longitudinal vs. towards the inner bend

Skid resistance measured with SRT in the longitudinal direction versus lateral direction towards the inner bend



Skid resistance: longitudinal vs. towards the outer bend

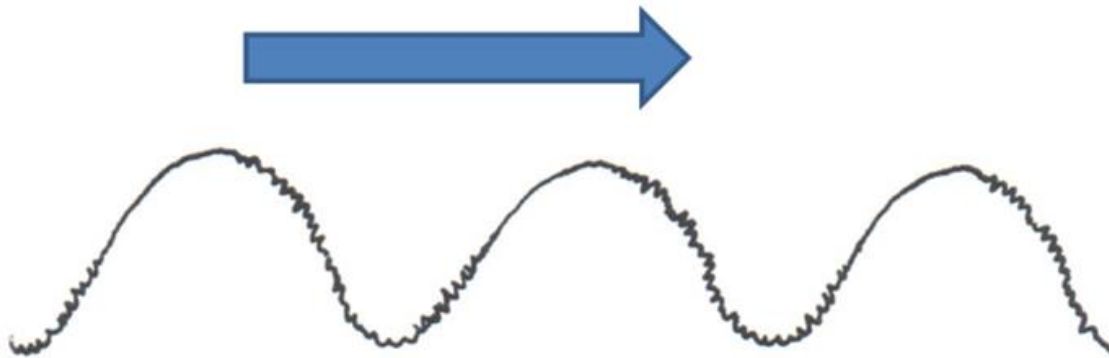
Skid resistance measured with SRT in the longitudinal direction versus lateral direction towards the outer bend



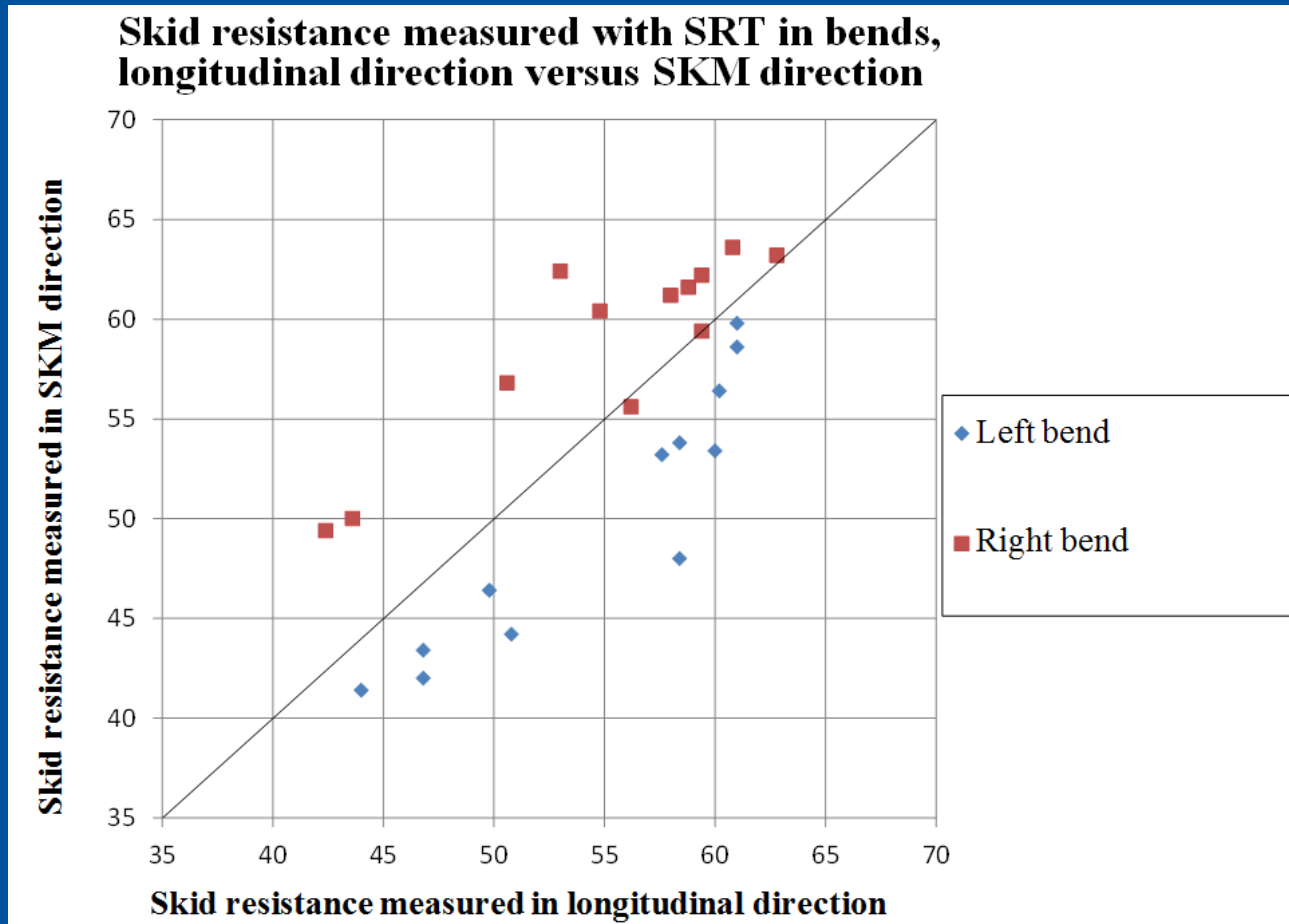
Underlying cause of the difference in skid resistance in lateral directions in bends

- By centrifugal force claims vehicle roughness in lateral direction towards outer bend
- Effect micro texture by polishing in one single direction

Towards outer bend = polishing direction



Skid resistance: Longitudinal vs SKM-direction



Differences found in this study

Type of bend	Mean difference of skid resistance measured using the SRT in SKM direction	
	compared to skid resistance in the longitudinal direction	compared to normative skid resistance
Bend turning left	- 8%	+ 5%
Bend turning right	+ 8%	+ 18%

Summary

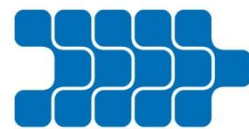
- Skid resistance in SKM-direction may deviate significantly on older coatings in bends
- Skid resistance SKM in bend turning left approaches the normative roughness better
- On locations where polishing occurs predominantly in longitudinal direction, larger differences can occur with the SKM compared to the normative skid resistance

Thesis:

When conducting SKM measurements, different maintenance standards for the skid resistance have to be used, which are dependent on the location and position of a road section

- Bend turning left
- Bend turning right
- Straight section
- Potential braking locations

Thanks for your attention



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